In the Claims

Please cancel claims 1-31, without prejudice, after adding newly presented claims 32-71 below.

1-31. (Canceled)

32. (Newly Presented) An optoelectronic device comprising:

a first mirror;

a second mirror;

an active region situated between the first mirror and the second mirror; and

at least one heat conducting layer in contact with the active region for carrying heat that is generated in the active region away from the active region.

33. (Newly Presented) An optoelectronic device according to claim 32 wherein the at least one heat conducting layer includes a lower heat conducting layer disposed below the active region and an upper heat conducting layer disposed above the active region.

34. (Newly Presented) An optoelectronic device comprising:

a first mirror;

a second mirror;

an active region situated between the first mirror and the second mirror; and

at least one heat conducting layer in thermal communication with the active region, at least one of the heat conducting layers including a doping profile across its thickness that has a higher doping level at or near an electric field trough and a lower doping level at or near an electric field peak.

35. (Newly Presented) An optoelectronic device according to claim 34 wherein the active region comprises:

a lower p-n junction;

a first tunnel junction above the lower p-n junction;

an upper p-n junction; and

a second tunnel junction above the upper p-n junction.

36. (Newly Presented) An optoelectronic device according to claim 35 wherein at least one of the heat conducting layers is n-type.

37. (Newly Presented) An optoelectronic device according to claim 36 wherein the first and second mirrors are n-type.

38. (Newly Presented) An optoelectronic device according to claim 34 wherein the one or more heat conducting layers include a lower heat conducting layer disposed below the active region and an upper heat conducting layer disposed above the active region.

39. (Newly Presented) An optoelectronic device according to claim 38 wherein the upper heat conducting layer is isotropically formed as a current spreader.

40. (Newly Presented) An optoelectronic device according to claim 39 wherein the upper heat conducting layer is lightly doped.

41. (Newly Presented) An optoelectronic device, comprising:

a first mirror;

a second mirror;

an isolation region defining an aperture wherein the aperture encircles an optical cavity of the optoelectronic device;

an active region situated between the first mirror and the second mirror; and

at least one heat conducting layer in thermal communication with the active region and extending across at least part of the optical cavity.

42. (Newly Presented) An optoelectronic device according to claim 41 wherein the at least one heat conducting layer extends across the optical cavity defined by aperture of the isolation region.

43. (Newly Presented) An optoelectronic device according to claim 41 wherein the isolation region includes an isolation layer that defines the aperture.

44. (Newly Presented) An optoelectronic device according to claim 41 wherein at least part of the optical cavity is doped to have a low resistance.

45. (Newly Presented) An optoelectronic device according to claim 41 wherein the first mirror includes a number of DBR mirror layers, and the isolation region includes an isolation layer that is interposed between selected DBR mirror layers and defines the aperture.

46. (Newly Presented) An optoelectronic device according to claim 45 wherein the isolation region further includes an isolation implant extending around, and spaced outwardly from, at least part of the aperture of the insulating layer and traverses through the insulating layer and at least part of the first mirror.

47. (Newly Presented) An optoelectronic device according to claim 46 wherein the isolation implant defines an aperture that is larger than the aperture of the insulating layer.

48. (Newly Presented) An optoelectronic device according to claim 47 wherein the aperture of the isolation implant is substantially coaxial with the aperture of the insulating layer.

49. (Newly Presented) An optoelectronic device according to claim 41 where the isolation region corresponds to an etched region.

50. (Newly Presented) An optoelectronic device according to claim 41 wherein the isolation region includes an isolation implant.

51. (Newly Presented) An optoelectronic device according to claim 50 wherein the isolation implant includes a proton implant.

52. (Newly Presented) An optoelectronic device according to claim 41 wherein the at least one heat conducting layers includes a first heat conducting layer on one side of the active

region and a second heat conducting layer on the opposite side of the active region.

53. (Newly Presented) An optoelectronic device according to claim 41 wherein at least one heat conducting layer includes a doping profile across its thickness that has a higher doping level at or near an electric field trough and a lower doping level at or near an electric field peak.

54. (Newly Presented) An optoelectronic device according to claim 41 wherein the at least one heat conducting layer includes a uniform doping profile across its thickness.

55. (Newly Presented) An optoelectronic device according to claim 41 further including at least one tunnel junction at or near the active region.

56. (Newly Presented) An optoelectronic device according to claim 55 wherein the first mirror, the second mirrors and the at least one heat conducting layer are n-type.

57. (Newly Presented) An optoelectronic device according to claim 41 wherein the active region includes:

a first p-n junction;

a first tunnel junction disposed adjacent the first p-n junction;

a second p-n junction disposed adjacent to the first tunnel junction; and

a second tunnel junction disposed adjacent the second p-n junction.

58. (Newly Presented) An optoelectronic device according to claim 57 wherein the first p-n junction includes one or more quantum wells, and the second p-n junction includes one or more quantum wells.

59. (Newly Presented) An optoelectronic device, comprising:

a lower DBR mirror;

an upper DBR mirror;

an isolation layer situated in or adjacent to the upper DBR mirror, the isolation layer defining an aperture wherein the aperture encircles an optical cavity of the optoelectronic device;

an active region situated between the lower DBR mirror and the upper DBR mirror, the active region extending laterally beyond the aperture defined by the isolation layer; and

a first heat conducting layer situated between the active region and the upper DBR mirror and extending across the optical cavity.

60. (Newly Presented) An optoelectronic device according to claim 59 further comprising a second heat conducting layer situated between the active region and the lower DBR mirror and extending across the optical cavity.

61. (Newly Presented) An optoelectronic device that is energized by an energizing current, comprising:

a top mirror;

a bottom mirror;

an active region situated between the top mirror and the bottom mirror; and

at least one heat conducting layer in thermal communication with the active region for removing heat from the active region, wherein the energizing current passes through at least part of each of the top mirror and the active region.

62. (Newly Presented) An optoelectronic device according to claim 61 wherein the energizing current also passes through at least part of the bottom mirror.

63. (Newly Presented) An optoelectronic device according to claim 62 wherein the top mirror, the bottom mirror and the active region are conductive.

64. (Newly Presented) An optoelectronic device according to claim 61 further comprising an isolation region situated in or adjacent to the top mirror, the isolation region defining a current confining aperture wherein the aperture encircles an optical cavity of the optoelectronic device.

65. (Newly Presented) An optoelectronic device according to claim 61 further comprising an isolation region situated in or adjacent to the bottom mirror, the isolation region defining a current confining aperture wherein the aperture encircles an optical cavity of the optoelectronic device.

66. (Newly Presented) An optoelectronic device, comprising:

a first mirror;

a second mirror;

an active region situated between the first mirror and the second mirror, the active region including:

a first p-n junction;

a first tunnel junction disposed adjacent the first p-n junction;

a second p-n junction disposed adjacent to the first tunnel junction; and

a second tunnel junction disposed adjacent the second p-n junction.

67. (Newly Presented) An optoelectronic device, comprising:

a first mirror;

a second mirror;

an active region situated between the first mirror and the second mirror;

an isolation layer defining an aperture that encircles an optical cavity of the optoelectronic device; and

within the aperture of the isolation layer, the optical cavity having one or more highly conductive layers.

68. (Newly Presented) An optoelectronic device according to claim 67 wherein the one or more highly conductive layers are doped to be highly conductivity.

69. (Newly Presented) An optoelectronic device according to claim 67 further comprises one or more lightly doped layers interposed between the isolation layer and the active region.

70. (Newly Presented) An optoelectronic device according to claim 67 wherein aperture of the isolation layer includes a tapered tip.

71. (Newly Presented) An optoelectronic device according to claim 70 wherein the tapered tip is positioned at or near an electric field null.